

WHAT IS CLAIMED IS:

1. An image display apparatus comprising:
at least one image forming element; and
an illumination optical system for illuminating
5 said image forming element with light from a light source,
wherein an image is formed through modulation of said light by said image forming element, and said illumination optical system can vary a light intensity distribution of said light on said image forming element.
lens array/s
353/0
variable lens
Intensity
2. An apparatus according to claim 1, wherein
said apparatus can supply a plurality of different
15 distributions as the light intensity distribution of
said light on said image forming element.
3. An apparatus according to claim 1, wherein
said apparatus can vary the light intensity
20 distribution of said light in an effective region of
said image forming element.
4. An apparatus according to claim 1, wherein:
said illumination optical system has a secondary
25 light source forming member for forming a plurality of
secondary light sources; and
when said image forming element is illuminated
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353/38
No primary
Sj. 22.1
M. 22.1
J. 22.1

lightsource or light beam?

(100%)

with a plurality of light beams from said plurality of
secondary light sources, projection magnifications of a
part or all of said plurality of light beams to said
image forming element are changed so as to make
5 switchable the relationship of the number of
overlapping light beams in a central portion of said
image forming element and the number of overlapping
light beams in a peripheral portion of said image
forming element between different and the same, thereby
10 varying the light intensity distribution in an
effective region of said image forming element.

5. An apparatus according to claim 1, wherein:
said illumination optical system has a secondary
15 light source forming member for forming a plurality of
secondary light sources; and
when said image forming element is illuminated
with a plurality of light beams from said plurality of
secondary light sources, the number of overlapping
20 light beams in a central portion of said image forming
element is structured to be larger than the number of
overlapping light beams in a peripheral portion of said
image forming element, and projection magnifications of
said plurality of light beams to said image forming
25 element are changed, thereby varying the light
intensity distribution in an effective region of said
image forming element.

ditto

6. An apparatus according to claim 5, wherein
said illumination optical system comprises a light
condensing optical element and varies said distribution
by moving said light condensing optical element in a
5 direction of an optical axis.

7. An apparatus according to any one of claims 1,
4, and 5, wherein said illumination optical system
comprises at least one lens array as a secondary light
10 source forming member for forming a plurality of
secondary light sources, and varies said distribution
by moving at least a part of said at least one lens
array.

curve
whole

15 8. An apparatus according to claim 7, wherein
said illumination optical system varies said
distribution by moving at least a part of said at least
one lens array in a direction of an optical axis.

20 9. An apparatus according to claim 7, wherein
said illumination optical system varies said
distribution by moving at least a part of said at least
one lens array in a direction perpendicular to an
optical axis.

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10. An apparatus according to claim 7, wherein
said illumination optical system varies said

distribution by rotating at least a part of said at least one lens array.

11. An image display apparatus comprising:

5 at least one image forming element; and
an illumination optical system for illuminating
said image forming element with light from a light
source,

10 wherein an image is formed through modulation of said
light by said image forming element, and said
illumination optical system can vary an illumination
distribution in an effective region of said image
forming element.

15 12. An apparatus according to claim 11, wherein
said apparatus can supply a plurality of different
distributions as said distribution.

13. An apparatus according to claim 11, wherein:
20 said illumination optical system has a secondary
light source forming member for forming a plurality of
secondary light sources; and
when said image forming element is illuminated
with a plurality of light beams from said plurality of
25 secondary light sources, projection magnifications of a
part or all of said plurality of light beams to said
image forming element are changed so as to make

112

switchable the relationship of the number of overlapping light beams in a central portion of said image forming element and the number of overlapping light beams in a peripheral portion of said image
5 forming element between different and the same, thereby varying said distribution.

14. An apparatus according to claim 11, wherein:
said illumination optical system has a secondary
10 light source forming member for forming a plurality of secondary light sources; and
when said image forming element is illuminated with a plurality of light beams from said plurality of secondary light sources, the number of overlapping
15 light beams in a central portion of said image forming element is structured to be larger than the number of overlapping light beams in a peripheral portion of said image forming element, and projection magnifications of said plurality of light beams to said image forming
20 element are changed, thereby varying said distribution.

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15. An apparatus according to claim 14, wherein
said illumination optical system comprises a light condensing optical element and varies said distribution
25 by moving said light condensing optical element in a direction of an optical axis.

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16. An apparatus according to any one of claims
11, 13, and 14, wherein said illumination optical
system comprises at least one lens array as a secondary
light source forming member for forming a plurality of
5 secondary light sources, and varies said distribution
by moving at least a part of said at least one lens
array.

10 17. An apparatus according to claim 16, wherein
said illumination optical system varies said
distribution by moving at least a part of said at least
one lens array in a direction of an optical axis.

15 18. An apparatus according to claim 16, wherein
said illumination optical system varies said
distribution by moving at least a part of said at least
one lens array in a direction perpendicular to an
optical axis.

20 19. An apparatus according to claim 16, wherein
said illumination optical system varies said
distribution by rotating at least a part of said at
least one lens array.

25 20. An apparatus according to claim 1 or 11,
further comprising:
a projection optical system for projecting an

image formed by said image forming element on a projection surface, wherein said apparatus includes a plurality of image forming elements, and said projection optical system overlappingly projects on 5 said projection surface images formed by said plurality of image forming elements.

21. An apparatus according to claim 20, wherein said image forming elements are for red, green, and 10 blue, respectively and said apparatus further comprises a plurality of dichroic mirrors for combining colors from said image forming elements.

22. An apparatus according to claim 20, wherein 15 said image forming elements are for red, green, and blue, respectively and said apparatus further comprises a plurality of dichroic prisms for combining colors from said image forming elements.

20 23. An image display system comprising:
an apparatus according to claim 1 or 11; and
an image recording apparatus for supplying an
image signal to said apparatus according to claim 1 or
11.
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24. An image display system comprising:
an apparatus according to claim 1 or 11; and

a computer for supplying an image signal to said apparatus.

25. An illumination system comprising:

5 a secondary light source forming member for forming a plurality of secondary light sources from light from a light source,
wherein an illumination surface is illuminated with a plurality of light beams from said plurality of
10 secondary light sources, and projection magnifications of a part or all of said plurality of light beams to said illuminated surface are changed, thereby varying an illumination distribution on said illuminated surface.

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26. An illumination system according to claim 25, wherein said distribution is varied by switching the relationship of the number of overlapping light beams in a central portion of said illuminated surface and the number of overlapping light beams in a peripheral portion of said illuminated surface between different and the same.

27. An illumination system according to claim 25,
25 wherein the number of overlapping light beams in a central portion of said illuminated surface is structured to be larger than the number of overlapping

light beams in a peripheral portion of said illuminated surface, and projection magnifications of said plurality of light beams to said illuminated surface are changed, thereby varying said distribution in an
5 effective region of said illuminated surface.

28. An illumination system according to claim 25,
comprising:

10 at least one lens array as said secondary light source forming member; and
a light condensing optical element,
wherein said distribution is varied by moving said light condensing optical element in a direction of an
optical axis.

15 29. An illumination system according to claim 27,
comprising:

20 at least one lens array as said secondary light source forming member; and
a light condensing optical element,
wherein said distribution is varied by moving said light condensing optical element in a direction of an
optical axis.

25 30. An illumination system according to claim 25,
comprising:

at least one lens array as said secondary light

source forming member; and
a light condensing optical element,
wherein said distribution is varied by moving at least
a part of said at least one lens array.

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31. An illumination system according to claim 30,
wherein said distribution is varied by moving at least
a part of said at least one lens array in a direction
of an optical axis.

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32. An illumination system according to claim 30,
wherein said distribution is varied by moving at least
a part of said at least one lens array in a direction
perpendicular to an optical axis.

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33. An illumination system according to claim 30,
wherein said distribution is varied by rotating at
least a part of said at least one lens array.

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34. An illumination system according to claim 26,

comprising:

at least one lens array as said secondary light
source forming member; and

a light condensing optical element,

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wherein said distribution is varied by moving at least
a part of said at least one lens array.

35. An illumination system according to claim 34, wherein said distribution is varied by moving at least a part of said at least one lens array in a direction of an optical axis.

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36. An illumination system according to claim 34, wherein said distribution is varied by moving at least a part of said at least one lens array in a direction perpendicular to an optical axis.

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37. An illumination system according to claim 34, wherein said distribution is varied by rotating at least a part of said at least one lens array.

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38. An illumination system comprising:
a secondary light source forming member for
forming a plurality of secondary light sources from
light from a light source,
wherein an illuminated surface is illuminated with a
plurality of light beams from said plurality of
secondary light sources, and projection magnifications
of a part or all of said plurality of light beams to
said illuminated surface are changed, thereby varying
an illumination distribution in an effective region of
25 said illuminated surface.

39. An illumination system according to claim 38,

wherein said distribution is varied by switching the relationship of the number of overlapping light beams in a central portion of said illuminated surface and the number of overlapping light beams in a peripheral portion of said illuminated surface between different and the same.

40. An illumination system according to claim 38,
wherein the number of overlapping light beams in a
central portion of said illuminated surface is
structured to be larger than the number of overlapping
light beams in a peripheral portion of said illuminated
surface, and projection magnifications of said
plurality of light beams to said illuminated surface
are changed, thereby varying said distribution.

41. An illumination system according to claim 38,-
.comprising:

at least one lens array as said secondary light
source forming member; and
a light condensing optical element,
wherein said distribution is varied by moving said
light condensing optical element in a direction of an
optical axis.

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42. An illumination system according to claim 40,
.comprising:

at least one lens array as said secondary light
source forming member; and
a light condensing optical element,
wherein said distribution is varied by moving said
5 light condensing optical element in a direction of an
optical axis.

43. An illumination system according to claim 38,
comprising:

10 at least one lens array as said secondary light
source forming member; and
a light condensing optical element,
wherein said distribution is varied by moving at least
a part of said at least one lens array.

15 44. An illumination system according to claim 43,
wherein said distribution is varied by moving at least
a part of said at least one lens array in a direction
of an optical axis.

20 45. An illumination system according to claim 43,
wherein said distribution is varied by moving at least
a part of said at least one lens array in a direction
perpendicular to an optical axis.

25 46. An illumination system according to claim 43,
wherein said distribution is varied by rotating at

least a part of said at least one lens array.

47. An illumination system according to claim 39,
comprising:

5 at least one lens array as said secondary light
source forming member; and
 a light condensing optical element,
wherein said distribution is varied by moving at least
a part of said at least one lens array.

10 48. An illumination system according to claim 47,
wherein said distribution is varied by moving at least
a part of said at least one lens array in a direction
of an optical axis.

15 49. An illumination system according to claim 47,
wherein said distribution is varied by moving at least
a part of said at least one lens array in a direction
perpendicular to an optical axis.

20 50. An illumination system according to claim 47,
wherein said distribution is varied by rotating at
least a part of said at least one lens array.

25 51. An image display apparatus comprising:
 at least one image forming element; and
 an illumination system according to claim 25 or 38

for illuminating said at least one image forming element with light from a light source.

52. An apparatus according to claim 51, further comprising:

a projection optical system for projecting an image formed by said image forming element on a projection surface, wherein said apparatus further comprises a plurality of image forming elements and 10 said projection optical system overlappingly projects on said projection surface images formed by said plurality of image forming elements.

53. An apparatus according to claim 51, wherein 15 said plurality of image forming elements are for red, green, and blue, respectively and said apparatus further comprises a plurality of dichroic mirrors for combining colors from said image forming elements.

20 54. An apparatus according to claim 51, wherein said plurality of image forming elements are for red, green, and blue, respectively and said apparatus further comprises a plurality of dichroic prisms for combining colors from said image forming elements.

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55. An image display system comprising:
an apparatus according to claim 51; and

an image recording apparatus for supplying an image signal to said apparatus.

56. An image display system comprising:
5 an apparatus according to claim 51; and
 a computer for supplying an image signal to said apparatus.

57. An apparatus according to claim 1 or 11
10 further comprising a projection optical system for projecting an image formed by said image forming element on a projection surface, wherein said apparatus has a single image forming element and said projection optical system projects the image formed by said single
15 image forming element on the projection surface.

58. An apparatus according to claim 51 further comprising a projection optical system for projecting an image formed by said image forming element on a
20 projection surface, wherein said apparatus has a single image forming element and said projection optical system projects the image formed by said single image forming element on the projection surface.